

the CANNON

University of Toronto Engineering Society

Weekly Issue

AT LEAST IN THE AIR TECHNOLOGY IS FLYING HIGH



the Canadair Challenger

By Barney Danson
Minister of Defence

Technology, it seems to me, is the modern philosopher's stone, which the ancients believed could turn base metals into gold. Technology can turn low-cost materials into high-priced products that raise productivity, profits, tax revenues and employment...

It confers power as well as wealth, military security as well as economic prosperity. Security and prosperity, in

fact, are indivisible. Wealth buys defence technology, and defence procurement, although a burden, can also be used to benefit the economy...

High technology, of course, is where investment pays off best. According to one American study, productivity in high technology companies grows 38 per cent faster than in low technology companies, employment grows 88 per cent faster, and profits 45 per cent faster. And it seems to me more than coincidence

that the best export performances are usually in industries with the largest research programs...

In 1972, the Cabinet approved, in principle, the purchase of new long-range patrol planes. And in 1974, after Hawker Siddeley had stated that unless it received massive government aid it could stop work on Canadian-designed STOL aircraft in Canada, we bought DeHavilland. The following year we bought Canadair, and then, with these elements of the industry stabilized, we set up a task force to study its needs

The task force recommended, among other things, that we give the \$1.1-billion patrol plane contract to Lockheed. There were long, hard negotiations. But

Lockheed needed that contract. They agreed to give our aircraft industry most of a U.S. Navy contract worth \$168-million. They committed themselves, with penalties for failure to comply, to channel another \$400-million into Canada. And they also agreed to do their best to spend 300-million or \$400-million more between 1981 and 1995. In all, we'll be getting most of our purchase price back in industrial benefits, as sizeable portion of it in high technology areas, and Lockheed are already a year ahead of their commitments.

The patrol plane is one of five main procurement programs. We're also buying German tanks, Swiss designed armored cars being built in London, Ont., new naval frigates, and \$2.3-billion worth of new fighter aircraft.

Over-all, our spending for capital equipment will increase, in real terms, by 12 per cent a year.

We want to use these programs to stimulate industry where it's most needed, in places like the Maritimes, Saskatchewan and Manitoba. And this isn't easy, as you well know...

But despite the difficulties we are generating regional business. Take the Aurora program in Nova Scotia. It's brought \$3.7-million to local companies in new orders. That's created some 100 new jobs directly and about 200 more indirectly. And orders over the next few years should total at least \$16-million.

Three other provinces have stated their interest in our

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REVIEW

by Hubert Vogt
3rd yr. Mechanical

INTRODUCING: THE HON. FRANK MILLER

—TREASURER OF ONTARIO

—NUMBER TWO MAN IN THE PROVINCIAL CABINET
AND ENGINEER

Intriguing is the word which the Honorable Frank Miller, P.Eng., Treasurer of Ontario, used to describe the apparent paradoxes of politics, and intriguing is what his audience found him to be. Last Friday at noon the Toronto Section of the Canadian Society for Mechanical Engineering held its first lunch hour meeting in the Hydro Place Auditorium, featuring Frank Miller as

speaker. Those attending were treated to a half hour of excellent, off the cuff comments by Miller on 'The Engineer as Politician', using his own experience as a humorous case study.

Born in Toronto, Frank Miller received his degree in Chemical Engineering from McGill University rather than

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the DeHavilland Dash-7

PRACTICALLY SPEAKING PROBE SURFACE THERMOMETER

by Colin Stevenson
Stationary Engineer

What would I consider one of the best diagnostic and analytical tools for the practical engineer? Without doubt, the surface thermometer, preferably the electronic digital with at most a ten second response time.

These usually cost between \$300 and \$400 and can quickly return their cost, especially in the area of Energy Conservation. For the practicalities involved I am going to point out a few case histories in what you might call the average medium sized industrial plant.

Case 1: A Data Centre where we have 130 single glazed windows approximately 9 feet by 5 feet and with a northern exposure. In this area, temperature and humidity control are extremely important due to the critical nature of

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At least in the air
cont. from page 1

New Fighter Aircraft program, and Manitoba has set up a task force to contact manufacturers. Out of 1,400 unfortunately, only 50 replied. It's an uphill fight, but with all of us working together as we are—people from ITC, and Supply and Services, and our program office, and the contractor's negotiators all crisscrossing the country, briefing provincial, local and company officials.—I think Manitoba will meet its target of 1,700 new jobs.

In this regard we've been aided by what we believe is a new technique: an industry advisory group. We seek the advice of key members of industry, mainly aerospace, but also others, on such matters as targets for benefits and how to assess proposals. I'll admit that this can be delicate, because there's sometimes a conflict of interest. But over-all, our experiment in bringing business into government

procurement—for the first time, as far as I'm aware—has been a definite success.

The emphasis throughout has been on technology: investments that foster technology and improve production techniques, the funding of research and

submit a supplementary bid. We said, "You have until Aug. 1 to come up with additional proposals, and we'll be looking in particular for benefits that build R and D in Canada." All the contractors responded. Their proposals have been evaluated, and the

already competitive—exporting 80 per cent of its output. Now it's also climbed out of its nosedive, and by spacing out our industrial benefits, we're helping to level the ups and downs of the past, assuring our companies a steady work load right through to the early nineties.

Our approach, I believe, can be seen in the aims of our New Fighter Aircraft program. It's just a shade too early to be able to spell out details, but in general we're calling for quality as well as quantity. Dollar value alone is not the sole criterion. We don't want orders that will leave us with shut-down industries, dying communities and unemployed specialists when they end. We want orders for things we do well, things we can sell on the world market, products with long-range spinoffs that will make us more productive, more competitive, and more self-sufficient.

We want to build centres of excellence, reinforce success. We can't be good in all areas; a small country has to specialize. The trend in the

world today is toward lower tariffs, and we can't go on pouring limited resources into companies that can't compete. We have to invest where we have a natural advantage, as in transportation or communication equipment, or a lead based on past experience, such as small gas turbine engines. We have to give priority to our most innovative and profitable enterprises.

We want to use our procurement leverage to bring in new technology. For example, the Aurora program brought Sperry Univac into Winnipeg, where they'll reach about a hundred Canadians how to make digital magnetic tape units. In the New Fighter Aircraft program—and this has been stated publicly—Northrop is offering to show us how to make composite materials, stronger than steel yet lighter than aluminum. And the other contenders are offering to transfer equivalent high technology.



P-3C Orion

development programs and joint technological ventures, those that have a structural effect on our economy beyond fluctuating defence expenditures. Raw materials and semi-processed goods will be rated low, or won't count, as benefits. We'll stress fully manufactured goods, and count only their Canadian content. As I told the House on June 29, we decided to give each contractor a chance to

final decision how rests with Cabinet. But that extra month was the most valuable we've spent, as reflected in the greatly enhanced quality of the proposals.

The results of the Aurora program are already apparent. It's given orders to some 30 aircraft and avionics firms, which in turn have about 175 sub-contractors. It's created, directly, some 2,200 new jobs, and indirectly, another five or six thousand. The aerospace industry was

review

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from the University of Toronto. The waiting list for applicants was too long. After graduation he worked for ALCAN and other companies as an engineer for about ten years, before opening a GM car dealership and finally at 44, entering politics as MPP for Muskoka.

Mr. Miller began his talk by outlining why he chose to toss his hat into the political arena. Most engineers that he talks to, Miller contended, were "shocked" that he could have sunk so low as to become a politician. Jokingly he points out that the switch car dealer to politician is only going from "second worst occupation to worst". The audience then listened appreciatively as he outlined why he thought the political process could benefit from the services of an engineer.

'The Premier Told Me, "I've got a doctor as Minister and I need an engineer to cut costs."

Pragmatism was the key quality which Miller thought that engineers had to offer, and this he found was what Premier Bill Davis was looking for when he appointed Miller as Assistant Health Minister. The way that Miller put it was: "The Premier told me, 'I've got a doctor as Minister (Dr. Potter was Health Minister then) and I need an engineer to cut costs.'"

One and a half years later Miller became Minister of Health and began to cut costs by his angel of death hospital closings. His reasoning for completely closing some hospitals is pure engineering pragmatism. The partial closing of a hospital would save \$10,000 per bed, whereas the total closing of a hospital would save \$40,000 per bed. All of the engineers present heartily agreed with Miller on his efficiency analysis.

Treasurer Frank Miller went on to describe many of the aspects of politics which are not so well known. Politics according to Miller is one of the hardest jobs around. Using his weekdays for Parliamentary business, he must then spend his weekends attending to riding affairs. Getting and

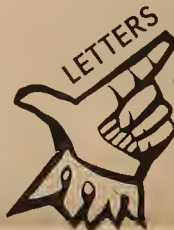
staying elected is where theoretical politics ends and reality begins. Most of the audience were also not aware of the threats against his life that Miller had received or of the extent to which political pressure contributed to his heart attack.

All of this has not discouraged Frank Miller at all. He speaks of his job with enthusiasm and is quick to encourage others to contribute personally to the political process. Although he admits that the pay is not terrific, the satisfaction of playing a part in government is also a compensation.

The deepest impression made on everyone present was that Frank Miller is a candid, pragmatic engineer at heart, who has taken on the robes of political power competently. This became very clear when he was asked about the effect of a minority on parliamentary government. After asking whether anyone from the newspapers was in the audience, he lashed into some unusually fascinating pronouncements. Miller would rather see a Liberal majority government than a Conservative minority in the next provincial election. The parliamentary system does not work well in a minority situation, Miller expounded, and he could do his job much better in a majority situation. Presently, no one party can be held accountable for legislation.

Now do not expect Miller to be wearing a Stuart Smith button come campaign time, for although he never actually said so, Miller would like nothing more than to be treasurer under a Conservative majority government. In concluding, Miller made a pitch for the job of politician: "If you are one who can put up with the daily attempts to make you look foolish, then politics is for you!"

The next meeting of the Toronto Section of the CSME is on November 16, when Professor D. Allen, from Mechanical Engineering and owner of Vibron Ltd., will address himself to the topic "The Engineer as Entrepreneur". This will be a supper meeting taking place in the Galbraith Building and all students are welcome to attend.



Dear sir

I was overjoyed to read in the Toike last week that the Cannon was not going to be printing any more. The mirth of this news was enhanced by the announcement that the Toike was to be printed EVERY week. However, I am sceptical that this news was accurate as I was not informed of this, and I am the Editor of the Cannon. Could you clear this up for me as I want to know if I will have the time complete any problem sets this week.

Signed,
An Editor

Sorry, looks like the real class is going to continue publishing twice as often as the Toike.

Another Editor

Dear Mr. Yates,

I write to express cheerful appreciation for the official blessing of my installation provided by the joyful strains of the L.G.M.B. the wonderful boom of the Cannon and the Royal Hard Hat. Without you it would have been dull!

With good wishes from a Skuleman,

Sincerely,
James Ham

Gentlemen,

Last year, I remember there were several complaints about the Toike Oike. In view of the kind of material that often turns up in the Toike, the existence of such complaints is not surprising. It leads one to question the role

of the Toike in general. But a question of greater importance in my mind—a question involving all Engineering activities—is what is the image of Engineering at U of T that other people have of us, and how important is maintaining that image. In other words, what do "they" think of "us"? "They" could be anyone within or outside of the University community. Different groups will answer these questions differently, and their opinions will influence in different ways their interactions with us.

Personally, I do not think I deserve the bad reputation that some less-informed members of the University community have given me. I have frequently experienced very cool responses from people in Arts and other disciplines; when they realize I am an Engineer, they seem to undergo a schizophrenic change in attitude towards me.

To a great extent, those responsible for such prejudices have no knowledge of what Engineering is like. Perhaps they read nought except the Toike, and thus form their opinions without realizing the Toike is intended as entertainment that they may choose to ignore, in whole or in part. It is also often true that those who criticise, do not criticise constructively, except to justifiably suggest that certain four-letter words are used excessively. The best way for one to change to Toike is surely to write one's own articles and submit them; then, the Toike may become what one wants it to be. And if it cannot suit everyone, it is then not unlike any other campus publication in this respect.

Other things which may perhaps damage the image of Engineers is a certain degree of excessive rowdiness. Engineering students are a more cohesive group than artsmen, and this togetherness allows us to organize more activities for our students. But there will

often be one or two individuals that think they can do stupid things and get away with it. If such a group of people were doing damage at a pub or on a caper, or anywhere where Engineers as a whole will be blamed, they should be put down and reprimanded for being so stupidly destructive. As engineers, we should instead become known for our amusing and well-engineered capers. Also, perhaps to prove our good intentions, we should clean up after ourselves too, rather than pay Physical Plant to do so.

Certainly, outside the University community, the reaction to our activities is markedly different. In industry, the University of Toronto is credited with having the oldest and most respected school of Engineering in Canada. The influence, and reporting, of engineering capers and events does not usually extend beyond the University's boundary. The occasional Toronto-high-school student gets his hands on a Toike and, provided his mother doesn't see it, the effect on us is negligible, though the high-school student himself is perhaps more likely than anyone to be misled into false beliefs.

Should we be less rowdy and more serious? I don't see why, so long as our activities are not destructive. Everyone needs a change of pace and a chance to enjoy themselves now and then; let such enjoyment be for the benefit of all. An overly-serious attitude is as detrimental as a foolish, destructive attitude both of these attitudes should be discouraged, not only to improve our image as engineers, but to improve us as individuals. What is needed is a greater sense of understanding and appreciation of just what we are—a bunch of students trying to be human beings.

Robert J. M. Anderson
Executive Faculty Council Rep.

Globe and Mail

CANADIAN TECHNOLOGICAL POSSIBILITIES

By J. J. Shepherd
executive director of the
Science Council of Canada.

Canada stands ready to buy a new fighter aircraft for its defence mission. For several months now, an energetic competition has been waged between European and American airplane manufacturers to supply this advanced weapons system to Canada. The massive purchase is in the advanced stage of decision making. About \$2.3-billion will be committed to the program with anywhere from 75 to 120 aircraft being involved.

In bidding for these enormous stakes, each of the foreign competitors has to offer not only a weapons system which meets stringent operational requirements, but a substantial package of offsetting benefits—by way of the spending the winning bidder will do in Canada—to Canadian industry.

Whatever the validity of the strategic requirement, and in addition to the issue of operational capability, competition seems to centre upon this matter of Canadian industrial benefits. In this area, the Canadian Government is being keenly insistent upon substantial responses, and the bidding companies themselves are doubtless exerting immense efforts to provide adequate economic returns to Canada.

Yet in spite of these initiatives, it is proper at least to question the likelihood of achieving substantial, or even adequate, returns to the Canadian economy for this major expenditure.

Our aerospace industry is already extremely buoyant. Employment at the airframe



plants, Canadair, DeHavilland and Douglas Canada, is rising rapidly from the low points of two years ago. Canadair is occupied with its commercially successful business jet—the Challenger—and with its water-bombers. DeHavilland is producing Twin Otters and Beavers, and is still rightfully optimistic about the DASH-7. Douglas is busy with DC-9 and DC-10 orders. In short, the airframe manufacturers are already in a strong growth phase.

The engine plants are busy with one of the largest commercial markets in decades now opening up through the new "economy" and wide-body jets. Rolls-Royce of Canada, Orenda and United Technologies with its famous PT-6 engine, are all in good health. ACE, the Canadian centre of excellence in aircraft simulators, has considerable business, and aviation electronics companies such as Marconi

have very substantial orders on the books.

It is a fair question therefore when commercial aviation is entering another boom period, whether in fact the Canadian aviation industry needs the New Military Fighter (NFA) program from a long point of view, at least at this point. Indeed, one might even ask whether an injection of military procurement at this time would not even create some element of costly disruption in an already strong, profitable growth pattern. Further, some of the aircraft being offered are already the subject of large international programs and are being built by existing consortiums of large foreign companies. Although this makes for low cost, what special new hardware, how many high-quality jobs will Canada get as a latecomer to such programs?

Given that the aviation manufacturing industry is not the likely beneficiary of the production offsets on this military purchase, it becomes important to consider where any economic benefits are to

be derived. Clearly the answer ought to lie in the transfer to other sectors of Canadian industry, of technologies critical to our future competitiveness in commercial markets; for instance, in energy products, automobile parts, communications equipment, transportation, and computer equipment.

Yet the current international state of affairs is

characterized by a groggy recognition of the competitive advantage to be derived from technology. It is difficult, therefore, to foresee what genuine technology transfer of a major nature is likely to take place, even in the rare cases where it may be within the power of the bidding company to make it happen.

Since much of the technological capability of

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SEE NO EVIL? HEAR IT

THE ACOUSTIC MICROSCOPE

The acoustic microscope, which forms images by sound waves, will soon take a place beside the electron microscope and the light microscope as a valuable research tool in science and industry. By next year, Calvin Quate and his research group at Stanford University hope to complete an acoustic microscope that can take pictures at sound frequencies of three billion cycles per second—equaling the resolution power of optical microscopes.

The instrument, which produces images of specimens by means of a scanning acoustic beam that reveals properties of matter that are

not detectable by light or electron microscopes, will open up new frontiers of research into the density, elasticity, and viscosity of materials. In industry the acoustic microscope could be used for detecting flaws in crystals of gems and for locating faults in integrated circuits. In addition, a number of medical diagnostic uses for the microscope already have become apparent. Growing evidence indicates that cancerous tissue transmits sounds at a higher velocity than normal tissue. This velocity differential could be utilized to detect malignant growth. Sound waves may also be valuable in diagnosing certain forms of anemia and other blood disorders. Omni

cobalt-titanium alloy



optical image



acoustic image

SALES ENGINEERING

DID YOU HEAR THE ONE ABOUT THE TRAVELLING SALESMAN?

By Gordon R.S. Smith
Johns-Manville Corp.

A sales engineer has just been advised by a prospect's purchasing department that he will be given a contract for one of his company's products. This ends months of a sales program in which the salesman had first uncovered a need for one of his products, then persuaded the prospect to test it, had his own company run plant tests and presented results of this test to the prospect, described in detail what his product would do for the prospect (selling the prospect not only on the product but also on his company), and finally entered into the negotiations that clinched the sale.

During this campaign, the salesman had dealt with representatives from the prospect's production, process engineering, quality control and purchasing departments. He had brought to bear people from his own company's technical

service and production departments, plus its sales and general managements. Along the way, he had to overcome delays, inertia and personality clashes with the prospect's company, while contending with competitors' responses.

The sales engineer succeeded because he understood his company's goals, the needs of his prospect, and where at any given time he stood in the selling process, so that he always knew what his next step should be. In his dealings with the prospect's technical personnel, he had demonstrated technical competency with regard to that portion of the prospect's process that could use his product, and he had displayed thorough knowledge of his product and how it could fulfill the prospect's needs.

Throughout the entire sales process, the sales engineer had been enthusiastic and persuasive, as well as technically knowledgeable.

A successful sales campaign

provides the sales engineer with the psychological reward of realizing he has been a key factor in finding an outlet for one of his company's products, which means employment for many of the firm's people. The amount of his more tangible financial reward will depend on whether his remuneration is based on salary plus commissions for all sales over a set volume—with the commission coming to 20-30 per cent of his salary expectancy—or, on straight commissions or straight salary, with or without a year-end bonus.

In general, income for sales engineers is slightly higher than that for people in most other departments, except for administration. When a substantial part of income is derived from commissions or bonuses, a sales engineer's income can jump in one year if he wins an unexpectedly large order. Adjustments, however, will usually be made in following years, so that average earnings increases closely follow management's salary plan. Actually, top sales income can match or exceed the pay of engineers in middle management.

The sales scenario described is only one of many that are possible, and that will vary depending on the number and types of products a sales engineer has to offer customers.

At one end of the spectrum are the basic chemicals, which generally fall into the commodity category. Here the sales engineer will emphasize such things as price and reliable delivery. If he has a large number of chemicals to market, he will have only minimum time for detailed technical selling.

At the other end of the spectrum are engineering services, equipment, and specialty chemical products—all of which involve a considerable amount of technical assistance, and for which a premium price may be obtained for quality, highly technical knowledge and other such factors.

The most direct line of advancement for a sales engineer is to become a district sales manager, and from this step to become (possibly via several sales territories) general sales manager. In addition, many companies also look to the sales department to staff their marketing departments, from which the direct line of advancement is to general marketing manager.

Once he has made it into headquarters staff, other job opportunities open to him may be into such areas as advertising, corporate development, and research (although the usual flow is from research to the sales department). Any of these areas can lead to divisional and upper-management assignments.

Marketing responsibility is essentially that of running the business of getting products from the manufacturer to the customers. The market manager's assignment is to recommend and carry out programs related to distribution, pricing, promotion and technical service, and he is also usually involved in forecasting and planning.

Not everything about sales is glamor and glory. Depending on the amount and type of corporate support organizations, there may be a substantial amount of detailed paperwork that must be rigorously attended to. When mistakes are made by others (as well as by himself), the sales engineer must deal with these in such a way as to avert the alienation of customers and the loss of sales.

The sales engineer is the front-line representative of his company and, besides being responsible for sales, he must also convey his company's policies and programs, some of which the customer may not like.

The prospective salesman must give up the detailed practice of engineering, which he will trade for skills in sales techniques, negotiation and motivation.

He will enjoy contacts with a wide variety of people and companies, and will have a large amount of independence and sense of accomplishment.

WE HAVE A FEW QUESTIONS:

- (1) Have you recently read any interesting engineering-related articles in magazines, journals, etc.?
- (2) Are you writing a thesis?
- (3) Do you know any engineers?
- (4) Do you have any special engineering-related hobbies or interests?

If you answered "yes" to any of the above questions, we're counting on you to write for the Cannon.

The Cannon needs articles for all departments - from major illustrated technical reports to short Diversions. So if you have anything of interest to other Engineers, let us know. The Cannon is your paper - your participation will guarantee its success.

The Cannon is distributed on Thursdays, whenever the Toike isn't. Deadline for copy is 5:00 PM Monday. Articles should be typed. The Cannon offices are on the third floor of the old Metro Library, across the aisle from the stores.

ENGINEERS! START PLANNING NOW FOR SUMMER JOBS IN '79

1. Check Placement Centre bulletin boards from early October so as not to miss out on opportunities with large national employers recruiting on campus
2. Be prepared - attend our resume and interview seminars offered regularly during the school year. Success in job hunting isn't all luck!
3. Start planning your own job search. Our Career Library contains many employer directories and lists by discipline of companies that have advertised summer jobs with us in the past.

GET A HEAD START AND ACT NOW!!

Career Counselling & Placement Centre
344 Bloor St. W., 4th Floor
(just west of Spadina)

FIROSH

BT2

If your Frosh card is stamped with all the appropriate stamps for Orientation as outlined in your Frosh Kit, you are entitled to a FREE U of T Engineering

T-SHIRT

Present yourself at the Stores on or after Tuesday, October 10 with your card.

ATTENTION ALL COMMITTEE ORGANIZATION AND CLUB CHAIRMEN

The Cannon is a publication that is designed to keep all of our Engineering faculty informed as to the goings on around Campus. Since the vast majority of the student population in our faculty don't know the full extent of or even the purpose of various organizations, clubs and committees, the Cannon would be an ideal way to publicize the activities and events that will occur.

As well as this, all relevant committee and club internal affairs can be reported on within these pages.

Accordingly, anyone wishing to submit interesting articles relevant to the above is welcome to, as this would be greatly appreciated by the entire student body.

All submissions should be put in the Cannon Mailbox no later than the Monday before publication.

the CANNON

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Associate Editors: Dana Williams, Rob Pupulin, Pete Rankin

Press: Craigie Stevenson
Hubert Vogt

the CANNON is supported by the Engineering Society. It is run by the students in the faculty of Engineering with the intent of providing the students in Engineering with an interesting and informative newspaper. All those who would like to help with your paper are welcome to. Submissions to the CANNON are also welcomed. They should be typed. The editors reserve the right to edit letters. The office of the CANNON is located on the Third Floor, Old Metro Library, 20 St. George St., Toronto, Ontario, M5S 2E4.

Practically Speaking cont. from page 1

computers (temperature has to be maintained at 72 degrees F and about 50% relative humidity.)

With single glazing, we had a constant condensation problem especially with the colder temperatures and high inside humidity. For this reason we decided to install 1/8 inch acrylic plastic about 4 inches in front of the existing windows.

Measuring with the surface probe thermometer we found on the day of installation that the difference in single glass as opposed to double glass was 19 degrees F. This made it relatively simple to work out a heat loss in the area and justify the cost of installation.

Case 2: Bearings an Electrical Motors and Pumps.

Generally speaking, a Stationary or Maintenance Engineer when checking the condition of a bearing relies on touch or in some cases by recording immersion temperature. In both instances, a check should be made with a surface thermometer at periodic intervals and readings recorded so that the corrective measures can be taken before a breakdown.

Case 3: Heat Exchangers—Many different types and applications, whether for heating or cooling.

In an oil cooler for a screw

type compressor check the temperature of oil entering and leaving and make a diagnosis from these figures. If, for example, the temperature reduction in the oil is not sufficient it would indicate deposits or restrictions in the flow of oil or insufficient water flow or indicate that the temperature is too high. The thermometer can be used to check each of these problems.

Case 4: Steam Traps—Possibly the greatest single loss in a process or heating system. Depending upon the type of steam trap a fairly accurate diagnosis can be made with a surface heat thermometer to determine if the steam trap is defective. In one summer a savings of \$45,000 was realized in an industrial plant. Defective steam traps were found and fixed with the use of a surface thermometer.

Case 5: Heat Loss Analysis of Buildings. Instead of using ASHRAE figures for heat loss analysis of different materials I find it much easier and more accurate to relate outside temperatures with inside temperatures on different materials and exposures. It is then fairly easy to decide if insulation would be practical or not.

Through these cases it can be seen that the surface thermometer is definitely one of the most applicable instruments for an engineer in the industry today.

EH—HEMM EH—HEMM

Engineering Executive Meeting
Nov. 1 at 5 P.M. at Hart House

October 26

Student Faculty Council Representatives

There will be a meeting of the Faculty council this afternoon at 2PM in BG 202. Student reps. are excused from class in order that they may attend.

The Lure of the Ocean

The eleventh annual Canadian Congress of Engineering Students will be held in Halifax, Nova Scotia, January 3 through January 7, 1979.

The theme for this year's congress is "professionalism". Such topics as engineering attitudes, ethics, and social legal responsibilities will be discussed in lectures, workshops and seminars. From past experience, this conference is expected to be worthwhile for all students attending.

The professional Development Committee plans to send four or five delegates to the C.C.E.S. applications are invited from all undergraduate members of the Engineering Society. Preference will be shown to students who have demonstrated an active interest in the affairs of the Eng. Soc. in the past, and to students who are willing to help in the preparations for this year's delegation. These preparations include a fund raising campaign to help defray the costs of transportation and registration. All interested students are asked to leave a note in the Professional Development mailbox (3rd floor, metro library)—outlining reasons for wishing to attend and listing qualifications such as Eng. Soc. experience—by November 10, 1978.

ENGINEERING WOMEN'S SPORTS

Up Coming Events:

- 1) Ice Hockey — sign up now
- 2) Badminton — entry deadline Nov. 1st

Sign Up Areas:

- 1) 3rd floor Metro Library next to the Coke Machine
- 2) 2nd floor Galbraith women's washroom

All sports are recreational, so come out and have some FUN!

Pat Murray
Women's Sports Commissioner
CHEM 7T9

Canadian Technological Possibilities cont. from page 3

foreign airframe corporations is financed by their governments, how can we be sure that embargoes will not be placed on know-how which is felt to be of great commercial potential? Materials technology, energy and micro-processor development—all this and more might be of value if we are afforded unfettered access, and offered complete rights to exploitation. How can that be guaranteed, and what major joint ventures can be instituted to ensure the effective conversion of the know-how to the long-term employment of Canadian skills?

At base, the problem of side benefits in this massive fighter purchase is that we are not yet sure what we want in terms of wither production or technical content. We are reacting to proposals rather than advancing definitive demands to the bidding contractors. We are, in short, spending \$2.3-billion without an industrial strategy or a technology policy. The cost involved is the loss of future jobs because we will not be using this defence procurement to enhance our long-term industrial competitiveness.

Perhaps one of our major inhibitions is our unwillingness, or inability, to think and act in sufficiently bold or strategic terms about the kind of offset benefits we need. Yet, for so huge a purchase, government-to-government negotiations are involved, and we must operate at higher levels with wider national trading considerations. We must learn to bargain, and bargain hard, at a national and political level, rather than discuss piecemeal technology contributions at junior levels. Why should we not propose, for instance, in return for buying these fighters, that the foreign government involved help Canada finance the next stage of CANDU development—the thorium cycle—with a promise to buy CANDU at the end of that development phase?

It is possible to barter the fighter for access to the U.S. or NATO satellite market, or to the U.S. military simulator business? Could we develop a major joint venture in automobiles or trucks to get us out of the depressing cycle of building branch plants for Ford and General Motors? Would a joint venture in low-cost satellite ground stations be a viable proposition? A contract for \$2.3-billion is an exciting international trading prize. In an increasingly competitive world, large-scale bargaining is to be expected and desired, and our fighter selection process must be such as to enable us to extract the maximum long-term national advantage.

Even at this late stage it is possible and desirable to reassess this major national procurement in terms of what technical, industrial and economic benefits we want and ought to derive from it. It is in Canada's interest that we plan before we purchase—because the war we are fighting is as much economic as it is military.

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